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RESEARCH ON REPETITIVE MOTION DISORDERS

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National Institute of Arthritis and Musculoskeletal and Skin Diseases
National Institute of Child Health and Human Development
National Institute of Neurological Disorders and Stroke
National Institute for Occupational Safety and Health

PURPOSE

This initiative invites applications directed to the study of the pathogenesis, epidemiology, prevention, and treatment of repetitive motion disorders.

HEALTHY PEOPLE 2000

The Public Health Service (PHS) is committed to achieving the health promotion and disease prevention objectives of "Healthy People 2000," a PHS-led national activity for setting priority areas. This PA, Repetitive Motion Disorders, is related to the priority area of chronic disabling conditions. Potential applicants may obtain a copy of "Healthy People 2000" (Full Report: Stock No. 017-001-00474-0 or Summary Report: Stock No. 017-001-00473- 1) through the Superintendent of Documents, Government Printing Office, Washington, DC 20402-9325 (telephone 202-512-1800).

ELIGIBILITY REQUIREMENTS

Applications may be submitted by foreign and domestic, for-profit and non-profit organizations, public and private, such as universities, colleges, hospitals, laboratories, units of State and local governments, and eligible agencies of the Federal government. Foreign institutions or organizations in foreign countries are not eligible for First Independent Research Support and Transition (FIRST) (R29) awards. Applications from minority individuals, women, and persons with disabilities are encouraged.

MECHANISM OF SUPPORT

The support mechanisms for grants in this area will be the individual investigator-initiated research grant (R01) and the First Independent Research Support and Transition (FIRST) Award (R29).

Applicants or collaborators from institutions that have a General Clinical Research Center (GCRC) funded by the National Center for Research Resources may wish to identify the GCRC as a resource for conducting the proposed research. If so, a letter of agreement from the GCRC program director should be included with the application.

RESEARCH OBJECTIVES

Background

The words "repetitive motion disorder" describe a constellation of conditions that primarily affect the soft tissues, including the nerves (e.g., carpal tunnel syndrome), tendons (e.g., tenosynovitis, peritendinitis, epicondylitis), and muscles (e.g., tension neck syndrome). These conditions are common, are often insidious in their onset, and may or may not have relatively clear diagnostic criteria. In addition, their etiologies are often multifactorial, with work activities often contributing significantly, but not solely, to their development or exacerbation. This relationship to work is significant. In 1992, 60% of new occupational illnesses were associated with repetitive motion. The national rate of reported repetitive motion disorders has increased 880%, from 5 cases per 10,000 workers in 1982 to 44 cases per 10,000 workers in 1992. The highest rates generally occur in industries with a substantial amount of repetitive work (e.g., meat and poultry processing, automobile manufacturing). Recently, the Bureau of Labor Statistics has reported an increase in repetitive motion disorders in "safe industries", such as data entry jobs using a computer.

Despite the increasing prevalence of these disorders, and the fact that they have become an extremely costly public health problem, there are important gaps in our knowledge as relates to the pathophysiology and etiology of repetitive motion disorders. In addition, there is uncertainty regarding the optimal methods to diagnose, treat, and prevent them.

The current Program Announcement (PA) represents a continued interest in repetitive motion disorders, and is the direct outgrowth of an NIAMS and American Academy of Orthopaedic Surgeons sponsored workshop on the status and future research directions on Repetitive Motion Disorders of the Upper Extremity, held in June 1994. A primary objective of the workshop was to develop suggestions for future research directions in the pathogenesis, treatment, and prevention of repetitive motion disorders. A more detailed description of the proceedings and suggested research topics is available in Repetitive Motion Disorders of the Upper Extremity, edited by S. L. Gordon, S. J. Blair, and L. J. Fine, American Academy of Orthopaedic Surgeons, Chicago, 1995.

Scope

Through the use of this PA, the NIAMS, the NICHD, the NINDS, and the NIOSH anticipate the receipt of a broad range of applications targeted, but not limited, to the following areas:

(1) Pathophysiology: Biomechanical Loads

o Develop and validate methods and models for predicting structural changes in soft tissues based on external exposure.

o Develop and validate methods for measuring biomechanical and biochemical changes in soft tissue.

o Compare the biologic and healing response of tissues to acute loading versus chronic loading.

o Identify thresholds of physiologic injury to soft tissue under repetitive loading conditions.

o Develop models for specific musculoskeletal disorders.

(2) Pathophysiology: Connective Tissue

o Study the structure-function relationships of human tendons and ligaments.

o Determine the components of tendon that detect and resist load.

o Investigate the innervation of tendons.

o Elucidate the mechanisms by which cells perceive and respond to mechanical stimulation and loads.

o Define the structure, composition, and pathology of the fibrocartilaginous regions of tendon (includes fibrocartilage development and how associated with tendon pathology).

o Study the effects of repetitive motion on synovium.
o Develop an animal model for investigating the effects of repetitive use and overuse of tendons, ligaments, and synovium.
o Investigate the influence of age, gender, and genetics on the development of repetitive motion disorders.
o Develop diagnostic criteria to distinguish between painful musculoskeletal syndromes having no physical findings and those with a structural mechanism.

(3) Pathophysiology: Muscle
o Evaluate the relationship among cognitive/attention demands, muscle activity, and pathophysiology in patients and controls with disorders associated with repetitive motion.
o Evaluate the relationship between localized fatigue, discomfort, perceived exertion, and muscular disorders.
o Define the acute and chronic injury mechanisms in skeletal muscle.
o Define the role, if any, of altered muscle fiber recruitment patterns in repetitive motion disorders.
o Define the conditioning methods required to prevent muscle injury.
o Determine clinical indicators of muscle dysfunction.
o Determine which systemic and/or muscle tissue factor(s) limit the rate and degree of recovery following an overuse injury.

(4) Pathophysiology: Nerve
o Develop and validate a peripheral nerve compression model as related to mechanical issues (i.e., extrinsic pressure).
o Explore changes in central neuronal function in repetitive motion syndrome.
o Characterize nerve damage in repetitive motion disorders (e.g., what role do growth factors play here, and how does the presence of certain neurochemicals relate to the presence of the persistent pain associated with these disorders.
o Better understand the biochemical and other mechanisms that lead to sensitization of nociceptors in deep tissue, with resultant hyperalgesia (could lead to novel therapeutic approaches for deep pain).

(6) Clinical Issues
o Define more clearly which physical tests and diagnostic evaluations (e.g., sensibility testing, electrodiagnostic studies, and imaging studies) should be performed, and at what stage of disease progression.

o Develop improved electrodiagnostic, clinical, and other diagnostic tools for soft-tissue disorders of the upper limb.
o Determine the roles of ergonomic and workstation changes and exercise regimens, in prevention.
o Determine the value of drug treatment (including NSAIDs), physical/occupational/ manipulative therapies, rest/immobilization, injection, other common non-operative treatments, and surgery, in the clinical management of repetitive motion injuries.
o Determine which work and recreational activities are safe following treatment, and when it is appropriate to return to them.
o Determine the incidence of repetitive motion disorders and value of treatments in persons with pre-existing severe disability (e.g., brain injury, stroke, spinal cord injury, amputation, cerebral palsy).

No priority has been established among the research suggestions presented. Applications are encouraged in any scientifically meritorious research area related to the pathogenesis, treatment, or prevention of repetitive motion disorders. Research applications are encouraged from all basic science disciplines pertinent to this area, as well as the medical specialties providing health care for these patients, including, but not limited to: orthopaedic and neurosurgeons, occupational medicine physicians, internists and family practitioners, rheumatologists, physiatrists, chiropractic and osteopathic practitioners, and occupational and physical therapists.

INCLUSION OF WOMEN AND MINORITIES IN RESEARCH INVOLVING HUMAN SUBJECTS

It is the policy of the NIH that women and members of minority groups and their subpopulations must be included in all NIH supported biomedical and behavioral research projects involving human subjects, unless a clear and compelling rationale and justification is provided that inclusion is inappropriate with respect to the health of the subjects or the purpose of the research. This policy results from the NIH Revitalization Act of 1993 (Section 492B of Public Law 103-43).

All investigators proposing research involving human subjects should read the "NIH Guidelines for Inclusion of Women and Minorities as Subjects in Clinical Research," which have been published in the Federal Register of March 28,1994 (FR 59 14508-14513), and reprinted in the NIH Guide for Grants and Contract, Volume 23, Number 11, March 18, 1994.

APPLICATION PROCEDURES

Applications are to be submitted on the grant application form PHS 398 (rev. 5/95) and will be accepted at the standard application deadlines as indicated in the application kit. Applications kits are available at most institutional offices of sponsored research and may be obtained from the Division of Extramural Outreach and Information Resources, National Institutes of Health, 6701 Rockledge Drive, MSC 7910, Bethesda, MD 20892-7910, telephone 301/435-0714, email: ASKNIH@odrockm1.od.nih.gov. The title and number of the program announcement must be typed in Section 2 on the face page of the application.

Applications for the FIRST Award (R29) must include at least three sealed letters of reference attached to the face page of the original application. FIRST Award (R29) applications submitted without the required number of reference letters will be considered incomplete and will be returned without review.

The completed original application and five legible copies must be sent or delivered to:

DIVISION OF RESEARCH GRANTS
NATIONAL INSTITUTES OF HEALTH
6701 ROCKLEDGE DRIVE, ROOM 1040 - MSC 7710
BETHESDA, MD 20892-7710
BETHESDA, MD 20817 (for express/courier service)

REVIEW CONSIDERATIONS

Upon receipt, applications will be reviewed for completeness by the DRG. Incomplete applications will be returned to the applicant without further consideration.

Applications will be assigned on the basis of established Public Health Service referral guidelines. Applications will be reviewed for scientific and technical merit by an appropriate peer review group convened in accordance with NIH peer review procedures. As part of the initial merit review, all applications will receive a written critique and may undergo a process in which only those applications deemed to have the highest scientific merit, generally the top half of all applications under review, will be discussed, assigned a priority score, and receive a second level review by the appropriate national advisory council or board.

Review Criteria

o Scientific, technical, or medical significance and originality of proposed research;

o Appropriateness and adequacy of the experimental approach and methodology proposed to carry out the research;

o Qualifications and research experience of the Principal Investigator and staff, particularly, but not exclusively, in the area of the proposed research;

o Availability of the resources necessary to perform the research;

o Appropriateness of the proposed budget and duration in relation to the proposed research; and

o Adequacy of plans to include both genders and minorities and their subgroups as appropriate for the scientific goals of the research. Plans for the recruitment and retention of subjects will also be evaluated.

The Initial Review Group will also examine the provisions for the protection of human subjects and animal welfare and the safety of the research environment.

AWARD CRITERIA

Applications will compete for available funds with all other approved applications assigned to NIAMS and NINDS. The following will be considered in making funding decisions:

o Quality of the proposed project as determined by peer review
o Availability of funds
o Program relevance and balance among research areas of the announcement.

INQUIRIES

Written and telephone inquiries are encouraged. The opportunity to clarify any issues or questions from potential applicants is welcome.

For scientific programmatic inquiries contact:

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AUTHORITY AND REGULATIONS

Awards made in this program are described in the Catalog of Federal Domestic Assistance: No. 93.846, Arthritis, Musculoskeletal and Skin Diseases Research, No. 98.853, Clinical Research Related Neurological Disorders, and No. 93.854, Biological Basic Research in the Neurosciences. Awards will be made under the authority of the Public Health Service Act, Title III, Section 301 (Public Law 410, 78th Congress, as amended, 42 USC 241) and administered under PHS grant policies and Federal regulations 42 CFR Part 52 and 45 CFR Part 74.
This program is not subject to intergovernmental review requirements of Executive Order 12372 or Health Systems Agency review.

The PHS strongly encourages all grant and contract recipients to provide a smoke-free workplace and promote the non-use of all tobacco products. In addition, Public Law 103-227, the Pro-Children Act of 1994, prohibits smoking in certain facilities (or in some cases, any portion of a facility) in which regular or routine education, library, day care, health care or early childhood development services are provided to children. This is consistent with the PHS mission to protect and advance the physical and mental health of the American people.

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